Result documentation using R Markdown

Vanderlei Debastiani

10 August, 2016

R Markdown

R Markdown is a tool for RStudio for produce formatted output. R Markdowns supports several output formats including HTML, PDF, RTF, MS Word and LaTeX. R Markdown create a .rmd file with a easy syntax for edit and format the output formats. This tutorial use as example the .pdf output.

RMD structure

The .rmd file contains differents sections, this file is used in the *render* function for convert the .rmd file to the specified output.

YAML Header

The first section is the YAML Header (optional) for *render* options.

His section start with `---` and end with `---`.

```
---
title: "Your title"
author: "Your Name"
date: "date"
output: pdf_document
---
```

The options for the output are described in the functions *pdf_document*, *html_document*, *rtf_document*, *word_document* and *render* in the package *rmarkdown*. This options can be used as the output option YAML Header or directly in the *render* function.

Several arguments are supported for each output format. Some of options for pdf_document:

- fig_caption - Should figures be rendered with captions?;
- fig_height, fig_width - Default figure height and width (in inches) for document;
- highlight - Syntax highlighting: “tango”, “pygments”, “kate”, “zenburn”, “textmate”;
- keep_tex - Save a copy of .tex file that contains knitr output;
- number_sections - Add section numbering to headers;

Text formatted with R Markdown

The text in the output can be formatted using simple syntax. Some of basic options are listed below:

Simple text

`Plain text` for plain text;
For start a new paragraph end the line with two spaces;

Basic formatting text

`*italic*` for *italic*;
`**bold**` for **bold**;
‘codes‘ for `verbatim code`;
`superscript^2^` for superscript^2;
`subscript~2~` for subscript$_2$;
backslash for an escape character *, ‘ and \;
`> block quote` for > block quote;

Headers

Headers are designed using the #:

```
# Header 1
## Header 2
### Header 3
#### Header 4
##### Header 5
```

Equations

Equations are designed using `$`:
`$A = \pi*r^{2}$` for $A = \pi * r^2$;

For equation in block use `$$`:
`$$A = \pi*r^{2}$$` for

$$A = \pi * r^2$$

Links

http://www.google.com
link

Lists

For unordered list use *, + and -:

```
* item 1
+ sub-item 1
+ sub-item 2
- sub-sub-item 1
* item 2
```

- item 1
    - sub-item 1

    - sub-item 2
        * sub-sub-item 1
- item 2

For ordered list:

```
1. item 1
2. item 2
i) sub-item 1
A. sub-sub-item 1
```

1. item 1
2. item 2
    i) sub-item 1
        A. sub-sub-item 1

R codes (code chunks)

For insert R codes, as scripts and the results, use the chunk syntax begins with ‘ ‘ ‘ { r } and end with ‘ ‘ ‘. One or more lines can be include in the same block.

“‘{r}
data(CO2)
head(CO2)
summary(CO2[,4:5])
“‘

```
data(CO2)
head(CO2)
```

```
##   Plant   Type  Treatment conc uptake
## 1   Qn1 Quebec nonchilled   95   16.0
## 2   Qn1 Quebec nonchilled  175   30.4
## 3   Qn1 Quebec nonchilled  250   34.8
## 4   Qn1 Quebec nonchilled  350   37.2
## 5   Qn1 Quebec nonchilled  500   35.3
## 6   Qn1 Quebec nonchilled  675   39.2
```

```
summary(CO2[,4:5])
```

```
##       conc          uptake
##  Min.   :  95   Min.   : 7.70
##  1st Qu.: 175   1st Qu.:17.90
##  Median : 350   Median :28.30
##  Mean   : 435   Mean   :27.21
##  3rd Qu.: 675   3rd Qu.:37.12
##  Max.   :1000   Max.   :45.50
```

Chunk include some options for formatting the block of codes and for display the results. The arguments are specified inside the first pair of brace {r, highlight=FALSE }. Some of this options:

- collapse - collapse all output into single block (default = FALSE);
- echo - Display code in output document (default = TRUE);
- fig.height, fig.width - Dimensions of plots in inche;
- message - display code messages in document (default = TRUE);
- results (default = 'markup'):
  - 'asis' - passthrough results;
  - 'hide' - do not display results;
  - 'hold' - put all results below all code;
- warning - display code warnings in document (default = TRUE);
- highlight - highlight source code (default = TRUE);

For example:

“‘{r, highlight=FALSE}
# Show R version
getRversion()
“‘

```
# Show R version
getRversion()
```

```
## [1] '3.3.1'
```

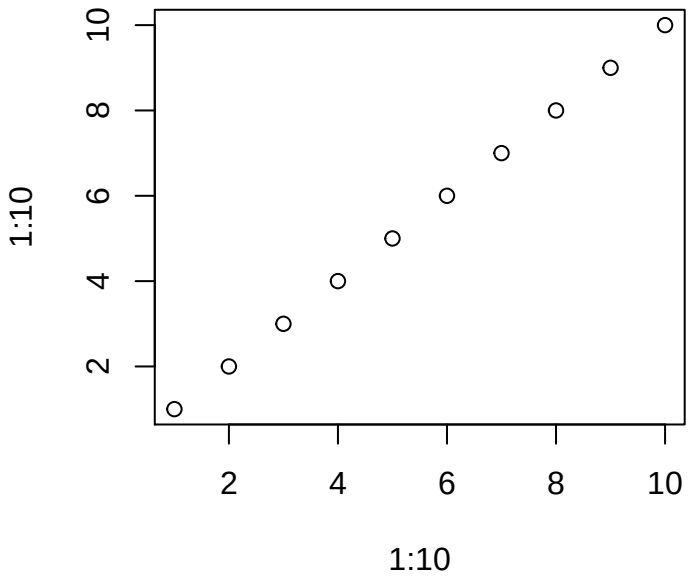
Plots

The plots can be include in the output result just like any R plotting function. By default the size of figure are specify in the YAML header or in the *render* function, but can also specify sizes for each plot using chunk options.

For example:

“‘{r, fig.width=4, fig.height=4}
plot(1:10,1:10)
“‘

```
plot(1:10, 1:10)
```



Tables

The tables can be include using print option in R codes (code chunks) or using functions for format data into tables available in R. Some examples are function *kable* in the package *knitr*, *xtable* in the package *xtable* and *stargazer* function in the package *stargazer*.

For example:

“‘{r}
require(knitr)
CO2[1:10,]
kable(CO2[1:10,], caption = "Table with kable")
“‘

```r
require(knitr)
CO2[1:10,]
```

```
##    Plant   Type  Treatment conc uptake
## 1    Qn1 Quebec nonchilled   95   16.0
## 2    Qn1 Quebec nonchilled  175   30.4
## 3    Qn1 Quebec nonchilled  250   34.8
## 4    Qn1 Quebec nonchilled  350   37.2
## 5    Qn1 Quebec nonchilled  500   35.3
## 6    Qn1 Quebec nonchilled  675   39.2
## 7    Qn1 Quebec nonchilled 1000   39.7
## 8    Qn2 Quebec nonchilled   95   13.6
## 9    Qn2 Quebec nonchilled  175   27.3
## 10   Qn2 Quebec nonchilled  250   37.1
```

```r
kable(CO2[1:10,], caption = "Table with kable")
```

Table 1: Table with kable

Plant	Type	Treatment	conc	uptake
Qn1	Quebec	nonchilled	95	16.0
Qn1	Quebec	nonchilled	175	30.4
Qn1	Quebec	nonchilled	250	34.8
Qn1	Quebec	nonchilled	350	37.2
Qn1	Quebec	nonchilled	500	35.3
Qn1	Quebec	nonchilled	675	39.2
Qn1	Quebec	nonchilled	1000	39.7
Qn2	Quebec	nonchilled	95	13.6
Qn2	Quebec	nonchilled	175	27.3
Qn2	Quebec	nonchilled	250	37.1

Export the .rmd file in the output formats

The *render* function (work only in the RStudio) is used for export the .rmd file in the finished formatted document. This function load the input .rmd file and convert to the specified output format. The kind of output format and additional options can be specified in the render function. For keep the LaTeX file the argument keep_tex must be change in the render function (or in the YAML Header). Load the required packages before run the render function.

```
require(rmarkdown)
require(knitr)
render("input.Rmd", pdf_document(keep_tex=TRUE))
```

More informations

http://rmarkdown.rstudio.com